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RESEARCH ARTICLE

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Taxonomic revision of the *Calotheca parvula* species group from southern Africa, with descriptions of three new species (Coleoptera, Chrysomelidae)

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Abstract

Calotheca Heyden, 1887 is a flea beetle genus that occurs predominantly in sub-Saharan Africa, comprising 29 species. The examination of new material is revealing a significantly higher species richness and high intraspecific variability. A group of five species, occurring in the southernmost portion of the distribution range for the genus, is here attributed to the *C. parvula* species group: *C. parvula* (Weise, 1908), *C. pallida* (Bryant, 1945), *C. danielssoni* **sp. nov.**, *C. oberprieleri* **sp. nov.**, and *C. prinslooi* **sp. nov.** Species in the *C. parvula* group have strong similarities in body shape and sculpture on the integument, spermathecal shape, and for most species the morphology of the median lobe of the aedeagus. A key to species of the *Calotheca parvula* group is provided along with photographs of the habitus, main diagnostic characters, median lobe of the aedeagus and spermatheca. In addition to the geographic distribution, the available information on the habitat, host plants, and phenology are provided for the five species analysed.

Keywords

Afrotropical Region, Alticini, diagnostic key, Galerucinae

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Introduction

The Alticini are a tribe of leaf beetles (Coleoptera, Chrysomelidae), included in the subfamily Galerucinae, along with the closely related Galerucini (Bouchard et al. 2011). They are the largest and most diverse tribe of leaf beetles, comprising over 540 genera and about 8000 extant species (Nadein 2012; Nadein and Bezděk 2014) and occur all over the world. Alticini are commonly defined as "flea beetles" because they have a metafemoral extensor tendon that enables them to jump (Furth and Suzuki 1998; Ge et al. 2011; Nadein and Betz 2016). Adult and larval stages feed mainly on the stems, leaves or roots, but rarely on the flowers of almost all the higher plant families in different environments, and generally have high levels of specialization (Jolivet and Verma 2002; Biondi et al. 2015; D'Alessandro et al. 2018b). The Afrotropical flea beetle fauna includes about 1600 known species in 103 genera, but a steady rise in the number of genera and species described during the last 10 years from this region, and the amount of unidentified material preserved in public collections and depositories, show that this taxon is still far from being fully known in Africa (Biondi and D'Alessandro 2008, 2010a, b, 2012, 2013a, b, 2015, 2016, 2017, 2018a, b; Döberl 2010; D'Alessandro et al. 2012, 2014, 2018a, 2019, 2020; Biondi 2017; Biondi et al. 2019, 2020; Biondi, unpublished data; D'Alessandro and Biondi 2018). The Afrotropical flea beetle genus *Calotheca* Heyden, 1887 was recently separated from the genus *Blepharida* Chevrolat, 1836 (Biondi at al. 2017). It is widespread in sub-Saharan Africa, with limited extensions into Israel and the Arabian Peninsula, and occurs in several types of forest and savannah environments (D'Alessandro et al. 2018a, b, 2019, 2020; Biondi et al. 2019). It can be characterised by the sinuate, deeply impressed frontal grooves, which extend from the dorsal ocular margin to the interantennal space, and the punctate lateral striae on the pronotum. These extend from the anterior margin to the disc and generally are L- or C-shaped. Some species also show short lateral longitudinal furrows or small dimples close to the pronotal base.

In the present contribution we reviewed the taxonomic status of *Calotheca parvula* (Weise, 1908), from the Republic of South Africa and Namibia, *C. pallida* (Bryant, 1945), from the Republic of South Africa, and three new species here described from the Republic of South Africa, *C. danielssoni* sp. nov., *C. oberprieleri* sp. nov., and *C. prinslooi* sp. nov.

Material and methods

Material examined consists of 91 dried pinned specimens preserved in the institutions listed under the abbreviations. The specimens were examined, and measurements and dissections were executed, under a Leica M205C stereo microscope. Photographs were taken using a Leica DFC500 camera and compiled using Zerene Stacker software version 1.04. Scanning electron micrographs were taken using a Hitachi TM-1000. Terminology follows D'Alessandro et al. (2016) for the median lobe of aedeagus, and Furth and Suzuki (1994) for the spermatheca. Geographical coordinates for the localities were reported in degrees and minutes (WGS84 format); coordinates and geographical

information that are included in square brackets were added to the label data by the authors using data from the Google Earth website. The internationally recognised codens of the depositories follow the list on The Insect and Spider Collections of the World Website (Evenhuis 2020). Chorotypes follow Biondi and D'Alessandro (2006).

Abbreviations

Collections and depositories:

BAQ Italy, University of L'Aquila, Collection of M. Biondi;
MCZC USA, Massachusetts, Cambridge, Harvard University, Museum of Comparative Zoology;
MZLU Sweden, Lund, Lund University;
NHMUK United Kingdom, London, The Natural History Museum;
SANC South Africa, Pretoria, South African National Collection of Insects;
UWCP Poland, Wroclaw, University of Wroclaw;
ZMHB Germany, Berlin, Museum für Naturkunde der Humboldt-Universität.

Morphology:

LA numerical sequence proportional to the length of each antennomere;
LAED length of aedeagus;
LAN length of antennae;
LB total length of body (from apical margin of head to apex of elytra);
LE length of elytra;
LP medial length of pronotum;
LSP maximum length of spermatheca, including ductus;
WE maximum width of elytra combined;
WP maximum width of pronotum.

Republic of South Africa: **RSA**; Provinces:

ECape Eastern Cape;
NCape Northern Cape;
WCape Western Cape.

Results

***Calotheca danielssoni* sp. nov.**
http://zoobank.org/6B90C1D8-01C0-4047-813A-B5B8319DF4EA
Figs 1A–E, 6

Calotheca parvula (Weise): Biondi et al. 2017: 124 (pars)

Type material. ***Holotype*** ♂**:** South Africa [RSA], Northern Cape, Vanrhyns[dorp] Pass [near Nieuwoudtville, 31°22'40"S, 19°01'04"E], W slope (R27), 660–760 m,

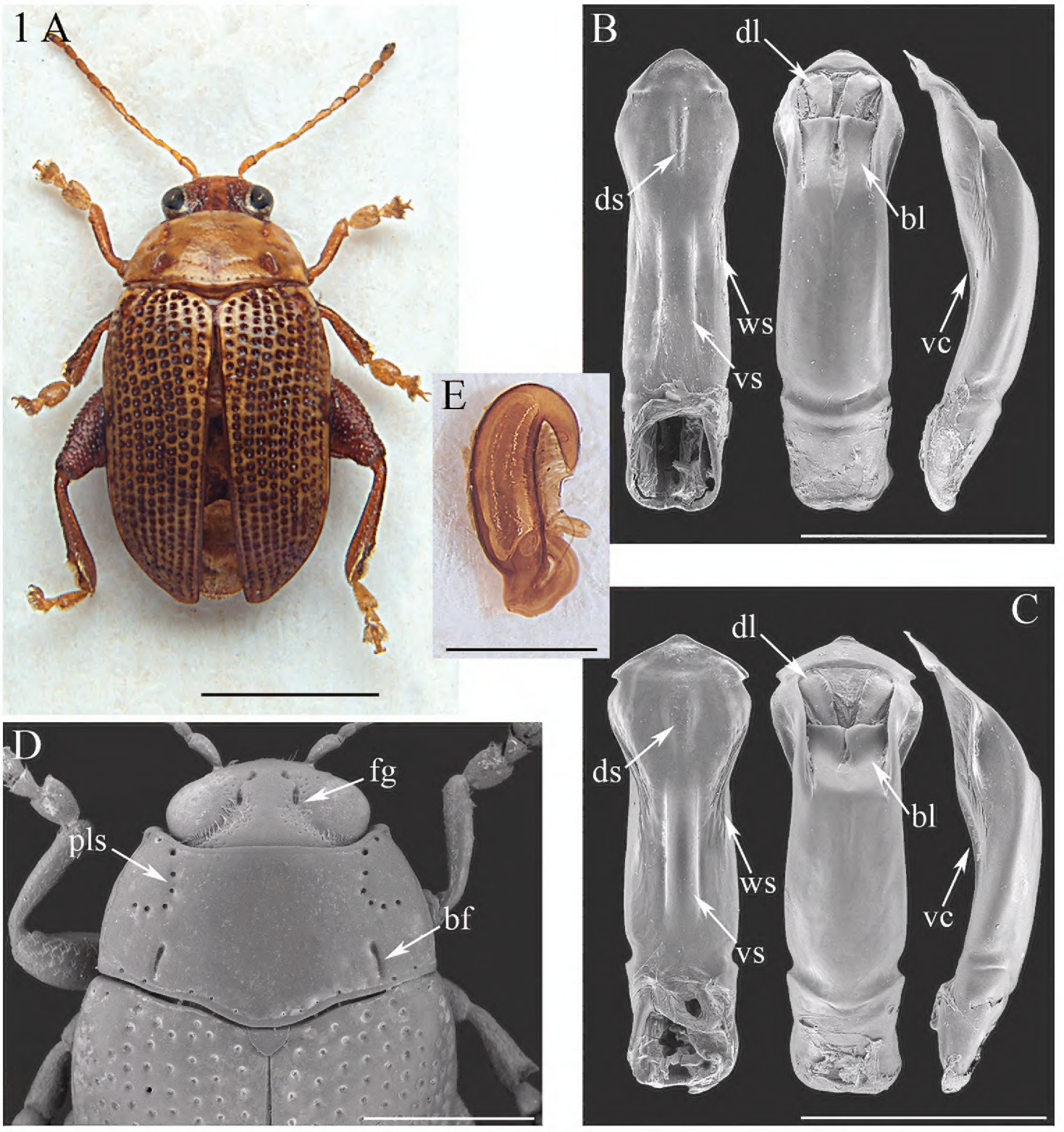

Figure 1. *Calotheca danielssoni* sp. nov. **A** habitus, ♂ (RSA: WCape, 10 Km S Citrusdal) **B** median lobe of aedeagus, from left to right in ventral, dorsal, and lateral view (RSA: WCape, 10 Km S Citrusdal) **C** ditto (holotype) **D** head, pronotum, and basal part of elytra, ♂ (RSA: WCape, Bidouw Valley) **E** spermatheca (RSA: WCape, Gifberg Pass). Abbreviations: bf = basal furrow; bl = basal lobe of dorsa ligula; dl = distal lobe of dorsa ligula; ds = distal sulcus; fg = frontal groove; pls = punctate lateral stria; vc = ventral carina; vs = ventral sulcus; ws = wrinkled surface. Scale bars: 2 mm (**A**); 1 mm (**B, D**); 0.5 mm (**E**).

fynbos, on *Rhus* sp., 16.ix.1994, P. Audisio, M. Biondi & M.A. Bologna leg. (SANC). ***Paratypes*:** Republic of South Africa: Cape Prov. [WCape] Koomplanskloof [sic!], 10 km S Citrusdal, 200–270 m, 32°40'S, 19°01'E, 04–08.x.1994, R. Danielsson leg., 1♂ (MZLU); C.P. [WCape], Gifberg Pass, 250–560 m, 31°45'S, 18°47'E, 17.ix.1986, R.[G.] Oberprieler leg., 1♂, 1♀ (SANC); C.P. [WCape], Clanwilliam District, Bidouw Valley, 32°08'S, 19°14'E, 7.ix.1987, C.D. Eardley leg. 1♂ (BAQ); WCape, Cederberg

Wilderness Area, Bosherberge, 650 m, -32.3987, 19.0907 [32°23'55"S, 19°05'26"E], lamp & night collection, 6.xii.2012, M. Wanat leg., 1♀ (UWCP); WCape, neigh. Piekenaarskloof Pass, 475 m (wet fynbos), 32°37.050'S, 18°57.458'E [32°37'04"S, 18°57'12"E], on *Rhus* sp., 13.ix.2006, M. Biondi & A. De Biase leg., 1♀ (BAQ); WCape, Groenkol Farm near Graafwater, 32°06'S, 18°42'E, 450 m, 15.iv.1997, R. Oberprieler & R. Stals leg., 1♀ (SANC).

Diagnosis. *Calotheca danielssoni* sp. nov. can be distinguished from the other species in the group by the elytral punctures, which are larger and more deeply impressed than those of the pronotal striae (Fig. 1A, D) (elytral punctures as large as, or smaller than, those of the pronotal striae in the other species). Males are similar to *C. parvula* regarding their small size and the generally darker colour, but are easily distinguishable by the basal pro- and mesotarsomere which are distinctly enlarged (only moderately enlarged in *C. parvula*) (Figs 1A, 4A), and the very different shape of the median lobe of the aedeagus (Figs 1B, C, 4C); females are clearly larger than in *C. parvula*. Based on the aedeagus, *C. danielssoni* sp. nov. shows major similarities with *C. pallida*, *C. oberprieleri* sp. nov. and *C. prinslooi* sp. nov. (Figs 1B, C, 2C, 3C, 5C), this is due to: the narrow medial sulcus in the apical third; the apex bearing small ventrolateral bulges (more prominent laterally in some specimens); the paired ventral carinae delimiting a wide ventral sulcus (present in *C. pallida* and *C. prinslooi* sp. nov.); and the dorsal ligula formed by two basal and two apical distal lobes. The aedeagus of *C. danielssoni* sp. nov. is, however, easily distinguishable by the apical part, which is distinctly wider than the remaining length, and the dorsal ligula, with shorter and clearly truncate basal lobes and more elongate distal lobes (Fig. 1B, C).

Description of the holotype (♂). Body elongate-elliptical in dorsal view (cf. Fig. 1A), moderately convex in lateral view; total body length (LB) = 4.70 mm; maximum pronotal width at base (WP = 2.08 mm); and maximum elytral width in basal third (WE = 2.50 mm). Head, femora and tibiae pale brown; frons, labrum, antennae, and tarsi paler brown; pronotum yellow, punctate lateral striae and basal furrows slightly darkened; elytra yellow with wide darkened punctures, small irregular reddish patches on the last interstria, and very sparse reddish patches on the disc. Head (cf. Fig. 1D) with surface rough, and micropunctate; several deeply impressed setiferous punctures between medial ocular margin and frontal grooves, and near the dorsal section of frontal grooves; frontal grooves deeply impressed, more so anteriorly, sinuate, extending from dorsal ocular margin to interantennal space; interantennal space about 1.5 times the length of the first antennomere; eyes elongate-ovate; dorsal interocular space slightly narrower than 1.5 times the transversal width of the eye; antennae slightly shorter than half the body length (LAN = 2.08 mm; LAN/LB = 0.44; LA: 100:40:53:60:67:67:67:67:67:60:87). Pronotum (cf. Fig. 1D) barely convex, sub-trapezoidal, distinctly transverse (LP = 1.00 mm; WP/LP = 2.08), with distinctly rounded sides; surface smooth, sparsely micropunctate, with additional small, rather dense but evenly distributed punctation; lateral pronotal striae C-shaped, with large deeply impressed punctures; basal furrows of pronotum deeply impressed; basal and apical margins with distinct borders, but not raised; lateral margins only slightly expanded, but visible in

dorsal view; anterior angles prominent and pointed; posterior angles slightly obtuse. Scutellum sub-triangular, rounded apically. Elytra (cf. Fig. 1A, D) moderately elongate and convex (LE = 3.50 mm; WE/LE = 0.71; LE/LP = 3.50), slightly sinuate laterally, jointly rounded apically; lateral margin narrow, barely visible in dorsal view; elytral punctation arranged in single regular rows formed by deeply impressed punctures; interstriae with finely microreticulate and micropunctate surface; last interstria carinate; humeral calli barely raised. Macropterous. Legs with basal pro- and mesotarsomeres distinctly enlarged (cf. Fig. 1A). Tarsal claws simple. Underside brown; apical abdominal ventrite without preapical sculpture or impressions. Median lobe of aedeagus (Fig. 1C) (LAED = 1.83 mm; LE/LAED = 1.92) with apical third distinctly wider than base in ventral view; apex subtriangular, widely obtuse, protruding laterally, with a rounded median tooth; ventral surface with two parallel carinae delimiting a rather wide sulcus which becomes shallower distally, and a narrow distal sulcus in the apical third; ventrolateral surface wrinkled medially; dorsal ligula short, formed by two basal lobes which are sub-rectangular and truncate apically, and two apical lobes which are subtriangular becoming wider distally; in lateral view, median lobe distinctly bent down to the apex.

Variability. Males (n = 4; mean ± standard deviation, range): LE = 3.45 ± 0.27 mm (3.05 ≤ LE ≤ 3.65 mm); WE = 2.44 ± 0.13 mm (2.25 ≤ WE ≤ 2.55 mm); LP = 1.04 ± 0.05 mm (1.00 ≤ LP ≤ 1.10 mm); WP = 2.03 ± 0.11 mm (1.88 ≤ WP ≤ 2.13 mm); LAN = 2.18 ± 0.18 mm (2.00 ≤ LAN ≤ 2.40 mm); LAED = 1.82 ± 0.12 mm (1.75 ≤ LAED ≤ 1.85 mm); LB = 4.60 ± 0.38 mm (4.05 ≤ LB ≤ 4.90 mm); LE/LP = 3.32 ± 0.21 (3.05 ≤ LE/LP ≤ 3.50); WE/WP = 1.20 ± 0.01 (1.19 ≤ WE/WP ≤ 1.20); WP/LP = 1.96 ± 0.08 (1.88 ≤ WP/LP ≤ 2.08); WE/LE = 0.71 ± 0.03 (0.67 ≤ WE/LE ≤ 0.74); LAN/LB = 0.47 ± 0.02 (0.44 ≤ LAN/LB ≤ 0.49); LE/LAED = 1.89 ± 0.10 (1.74 ≤ LE/LAED ≤ 1.97). **Females** (n = 4; mean ± standard deviation; range): LE = 4.48 ± 0.29 mm (4.25 ≤ LE ≤ 4.90 mm); WE = 3.21 ± 0.20 mm (3.05 ≤ WE ≤ 3.45 mm); LP = 1.19 ± 0.03 mm (1.15 ≤ LP ≤ 1.20 mm); WP = 2.52 ± 0.12 mm (2.43 ≤ WP ≤ 2.70 mm); LAN = 2.34 ± 0.09 mm (2.25 ≤ LAN ≤ 2.43 mm); LSP = 0.74 ± 0.01 mm (0.73 ≤ LSP ≤ 0.75 mm); LB = 5.86 ± 0.26 mm (5.60 ≤ LB ≤ 6.20 mm); LE/LP = 3.77 ± 0.21 (3.63 ≤ LE/LP ≤ 4.08); WE/WP = 1.28 ± 0.06 (1.22 ≤ WE/WP ≤ 1.36); WP/LP = 2.12 ± 0.09 (2.04 ≤ WP/LP ≤ 2.25); WE/LE = 0.72 ± 0.04 (0.69 ≤ WE/LE ≤ 0.78); LAN/LB = 0.39 ± 0.01 (0.38 ≤ LAN/LB ≤ 0.41); LE/LSP = 6.02 ± 0.35 (5.80 ≤ LE/LSP ≤ 6.53). Paratypes similar in shape, sculpture and colour to the holotype, but the darkened elytral patches are slightly variable. In one specimen the median lobe of aedeagus with apical third less expanded, the apex bearing small ventrolateral bulges rather than protruding laterally (Fig. 1B). Female with basal pro- and mesotarsomeres less enlarged than in male. Spermatheca (Fig. 1E) subcylindrical and generally straight basally, moderately slender to thickset; distal part clearly curved, slightly narrower apically, with a very short appendix; distal part shorter than half the length of the basal part; ductus basally inserted, moderately elongate, with either a narrow coil or a hint of a coil.

Etymology. The specific epithet is a noun in the genitive case after Roy Danielsson (Sweden, Lund), one of its collectors.

Distribution. Republic of South Africa (NCape, WCape) (Fig. 6). Chorotype: Southern-Western Afrotropical (SWA).

Ecological notes. Collected in fynbos and wet fynbos vegetation, between 200–760 m a.s.l., on *Searsia* sp. [= *Rhus* pars, cf. Moffett (2007)] (Anacardiaceae). Adults active in April, September, October, December.

***Calotheca oberprieleri* sp. nov.**

http://zoobank.org/99547CA8-987A-46D3-B9CC-29EFF844A1FB

Figs 2A–D, 6

Type material. ***Holotype*** ♂**:** South Africa [RSA], CP [ECape], Suurberg Nature Reserve, 900 m, 33°16'S, 25°45'E, 28.xi.1988, R.[G.] Oberprieler leg. (SANC). ***Paratypes*:** Republic of South Africa: Eastern Cape, between Grahamstown and Southwell [Southwell 33°24'58"S, 26°36'24"E], 500 m, 13.xi.2006, G. Osella leg., 1♂ (BAQ); Eastern Cape, W Bisho, km 35 da Peddie s.s.n. 2, 280 m, 33°16'69"S, 26°48'95"E [33°14'24"S, 26°45'22"E], 14.xi.2006, G. Osella leg., 1♂ (BAQ); CP [ECape], Umtiza, East London Coast Reserves, East London, 33°02'S, 27°49'E, 25.xi.1988, B.[=E.] Grobbelaar leg., 1♂ and 1♀ (SANC).

Diagnosis. *Calotheca oberprieleri* sp. nov. is very similar in shape, size, sculpture and colour to *C. pallida* and *C. prinslooi* sp. nov., from which it can be generally distinguished by: surface of median lobe of aedeagus flat ventrally (carinae delimiting a deep sulcus are evident in *C. pallida* and *C. prinslooi* sp. nov.) (Figs 2C, 3C, 5C); median lobe sinuate, narrowing in the apical third, wider basally than apically (sinuate and narrowing medially, and as wide basally as apically in *C. pallida*; and greatest width medially, wider basally than apically and tapering towards the apex in *C. prinslooi* sp. nov.) (Figs 2C, 3C, 5C); spermatheca only known for one specimen, subreniform and thickset basally (broadly subcylindrical and more slender in *C. pallida* and *C. prinslooi* sp. nov.) (Figs 2D, 3D, 5D); pronotal margins which are more rounded laterally (less rounded or more distinctly curved at apical third respectively in *C. pallida* and *C. prinslooi* sp. nov.) (Figs 2B, 3B, 5B).

Description of the holotype (♂). Body elongate-elliptical in dorsal view (Fig. 2A), moderately convex in lateral view; total length of body (LB) = 5.00 mm; maximum pronotal width near base (WP = 2.18 mm); maximum width of elytra in basal third (WE = 2.78 mm). Head, femora, and legs pale brown; pronotum yellow, punctate lateral striae and basal furrows distinctly darkened; elytra yellow, with darkened punctures, and small irregular very sparse shaded reddish patches. Head (cf. Fig. 2B) with surface microreticulate and micropunctate; several setiferous punctures between medial ocular margin and frontal grooves, and near the dorsal part of frontal grooves; frontal grooves deeply impressed, more so anteriorly, sinuate, extending from dorsal ocular margin to interantennal space; interantennal space about 1.5 times the length of the first antennomere; eyes elongate-ovate; dorsal interocular space slightly wider than 1.5 times the transversal width of the eye; antennae slightly shorter than half the body length (LAN = 2.33 mm;

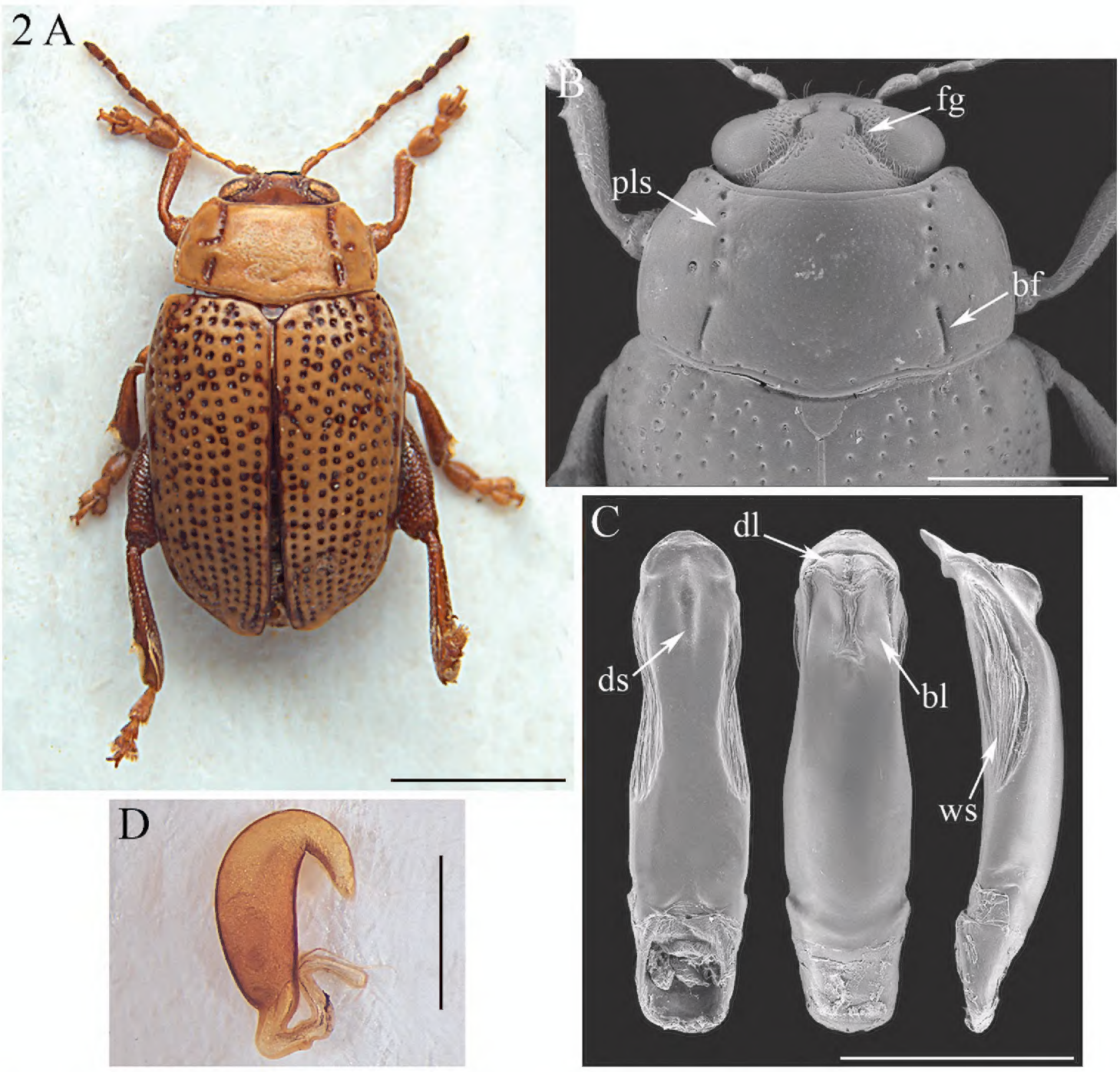

Figure 2. *Calotheca oberprieleri* sp. nov. **A** habitus, ♂ (holotype) **B** head, pronotum, and basal part of elytra, ♂ (RSA: ECape, between Grahamstown and Southwell) **C** median lobe of aedeagus, from left to right in ventral, dorsal, and lateral view (RSA: ECape, between Grahamstown and Southwell) **D** spermatheca (RSA: ECape, Umtiza). Abbreviations: bf = basal furrow; bl = basal lobe of dorsa ligula; dl = distal lobe of dorsa ligula; ds = distal sulcus; fg = frontal groove; pls = punctate lateral stria; ws = wrinkled surface. Scale bars: 2 mm (**A**); 1 mm (**B, C**); 0.5 mm (**D**).

LAN/LB = 0.47; LA: 100:50:75:64:79:79:79:79:79:71:100). Pronotum (cf. Fig. 2B) slightly convex, sub-trapezoidal, distinctly transverse (LP = 1.18 mm; WP/LP = 1.85), with clearly rounded sides; surface microreticulate and micropunctate, with additional small, rather dense, evenly distributed punctation; lateral pronotal striae C-shaped, with large, deeply impressed punctures; basal furrows of pronotum deeply impressed; basal and apical margins distinctly bordered, but not raised; lateral margins barely expanded, but visible in dorsal view; anterior angles prominent and pointed; posterior angles widely obtuse. Scutellum sub-triangular, rounded apically. Elytra (Fig. 2A, cf. 2B) moderately elongate and convex (LE = 3.83 mm; WE/LE = 0.73; LE/LP = 3.26), slightly sinuate laterally, jointly rounded apically; lateral margin narrow, barely visible in dorsal view;

elytral punctation arranged in single regular rows, punctures deeply impressed; interstriae with finely microreticulate and micropunctate surface; last interstria carinate; humeral calli barely raised. Macropterous. Legs with basal pro- and mesotarsomeres distinctly enlarged, sub-triangular (Fig. 2A). Tarsal claws simple. Underside pale brown; apical abdominal ventrite without preapical sculpture or impressions. Median lobe of aedeagus (cf. Fig. 2C) (LAED = 2.08 mm; LE/LAED = 1.84) distinctly sinuate laterally in ventral view; slightly narrower distally than basally; apex subrounded, with small ventrolateral bulges; ventral surface flat, with a narrow medial furrow in distal third; ventrolateral surface widely wrinkled; dorsal ligula short, formed by two elongate basal lobes and two shorter apical lobes; in lateral view, median lobe distinctly bent down to the apex.

Variability. Males (n = 4; mean ± standard deviation, range): LE = 3.99 ± 0.17 mm (3.83 ≤ LE ≤ 4.12 mm); WE = 2.88 ± 0.12 mm (2.78 ≤ WE ≤ 3.05 mm); LP = 1.21 ± 0.04 mm (1.18 ≤ LP ≤ 1.28 mm); WP = 2.30 ± 0.12 mm (2.18 ≤ WP ≤ 2.45 mm); LAN = 2.37 ± 0.11 mm (2.25 ≤ LAN ≤ 2.50 mm); LAED = 2.10 ± 0.12 mm (2.00 ≤ LAED ≤ 2.28 mm); LB = 5.12 ± 0.12 mm (5.00 ≤ LB ≤ 5.28 mm); LE/LP = 3.29 ± 0.06 (3.25 ≤ LE/LP ≤ 3.38); WE/WP = 1.25 ± 0.02 (1.24 ≤ WE/WP ≤ 1.28); WP/LP = 1.90 ± 0.04 (1.85 ≤ WP/LP ≤ 1.94); WE/LE = 0.72 ± 0.01 (0.72 ≤ WE/LE ≤ 0.73); LAN/LB = 0.46 ± 0.02 (0.44 ≤ LAN/LB ≤ 0.48); LE/LAED = 1.90 ± 0.08 (1.84 ≤ LE/LAED ≤ 2.03). **Females** (n = 1): LE = 4.50 mm; WE = 3.38 mm; LP = 1.28 mm; WP = 2.65 mm; LAN = 2.35; LSP = 0.80 mm; LB = 5.75 mm; LE/LP = 3.53; WE/WP = 1.27; WP/LP = 2.08; WE/LE = 0.75; LAN/LB = 0.41; LE/LSP = 5.63. Paratypes very similar in shape, sculpture and colour to the holotype. Female with basal pro- and mesotarsomeres less enlarged than in male. Spermatheca (Fig. 2D) with basal part subreniform, thickset; distal part softly bent, slightly narrower apically, with a very short appendix; distal part clearly shorter than half the length of the basal part; ductus basally inserted, moderately elongate, and with a hint of a coil.

Etymology. The specific epithet is a noun in the genitive case after Rolf G. Oberprieler (Australia, Canberra), one of its collectors.

Distribution. Republic of South Africa (ECape) (Fig. 6). Chorotype: Southern-Western Afrotropical (SWA).

Ecological notes. Habitat and host plants unknown. Collected between 280–900 m a.s.l. Adults active in November.

Calotheca pallida (Bryant, 1945)

Figs 3A–D, 6

Blepharidella pallida Bryant, 1945: 340
Calotheca pallida (Bryant): Biondi et al. 2017: 123 (pars)

Type material examined. ***Lectotype*** ♀**:** Mossel Bay [34°07'11"S, 22°04'02"E]/S.W. Africa [RSA: WCape], R.E. Turner, Brit. Mus. 1928-119 (M. Biondi des. 2017) (NHMUK). ***Paralectotypes*:** Same data as lectotype, 1♀ (NHMUK); ditto, Brit. Mus. 1921-210, April 1921, 1♂ (NHMUK).

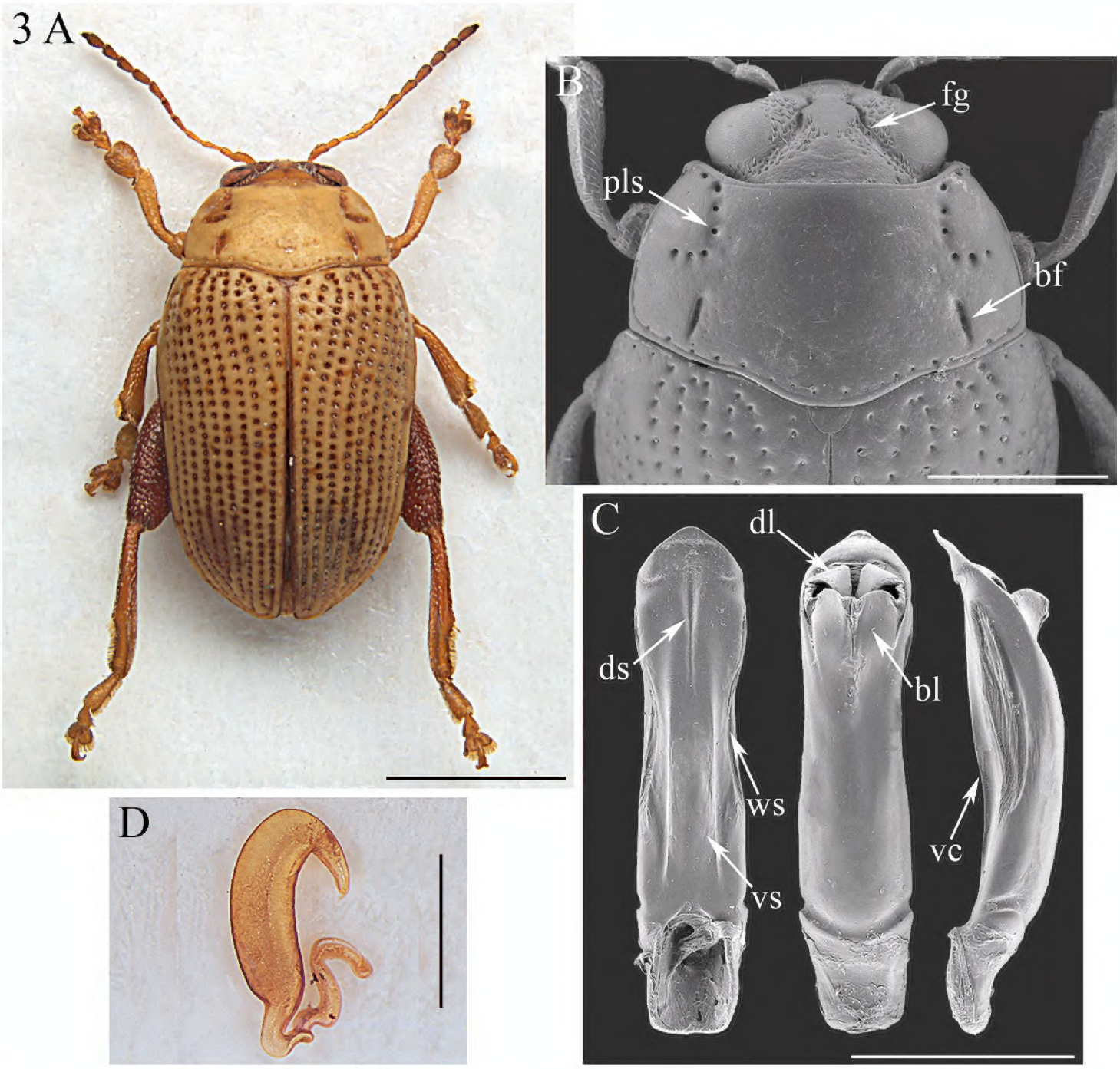

Figure 3. *Calotheca pallida* (Bryant, 1945) **A** habitus, ♂ (RSA: WCape, Stilbaai Nature Reserve) **B** head, pronotum, and basal part of elytra, ♂ (RSA: WCape, Stilbaai Nature Reserve) **C** median lobe of aedeagus, from left to right in ventral, dorsal, and lateral view (RSA: WCape, Mossel Bay) **D** spermatheca (RSA: WCape, Stilbaai Nature Reserve). Abbreviations: bf = basal furrow; bl = basal lobe of dorsa ligula; dl = distal lobe of dorsa ligula; ds = distal sulcus; fg = frontal groove; pls = punctate lateral stria; vc = ventral carina; vs = ventral sulcus; ws = wrinkled surface. Scale bars: 2 mm (**A**); 1 mm (**B, C**); 0.5 mm (**D**).

Additional material examined. Republic of South Africa: Cape Pr. [WCape], Mossel Bay, 34°08'S, 22°10'E, 15.i.1986, J.M. Carpenter leg., 3 specimens (MCZC); ditto, xii.1934. R.E. Turner leg., B.M. 1935-73, 1 specimen (NHMUK); CP [WCape], Stilbaai Nature Res.[erve], 34°22'S, 21°26'E, 02.xii.1988, B.[=E.] Grobbelaar leg., 3 specimens (SANC).

Taxonomic remarks. Head, antennae and legs pale brown; tarsi and basal antennomeres even paler brown; pronotum yellow, with punctate lateral striae and basal furrows slightly darkened; elytra yellow, with darkened punctures and, in some specimens, small, sparse irregular pale brown patches on disc (Fig. 3A). Pronotal lateral striae C-shaped, with large deeply impressed punctures; basal furrows of pronotum

deeply impressed; pronotal punctation very fine (Fig. 3B). Basal pro- and mesotarsomeres in male distinctly enlarged, subtriangular (Fig. 3A). Median lobe of aedeagus (Fig. 3C) distinctly sinuate laterally in ventral view; as wide basally as distally; apex subtriangular, widely obtuse and rounded laterally with small ventrolateral bulges; ventral surface with two carinae delimiting a wide sulcus, and a narrow distal sulcus in the apical third; ventrolateral surface wrinkled; dorsal ligula short, formed by two subtruncate basal lobes and two shorter subtriangular apical lobes; in lateral view, median lobe distinctly bent down, and sinuate apically. Spermatheca (Fig. 3D) with basal part subcylindrical, relatively slender, distinctly curved; distal part abruptly bent, curved to the apex, with a very short appendix; distal part clearly shorter than half the length of the basal part; ductus basally inserted, elongate, uncoiled but with wide loops.

Biometrics. Males (n = 5; mean ± standard deviation, range): LE = 3.99 ± 0.14 mm (3.75 ≤ LE ≤ 4.10 mm); WE = 2.90 ± 0.12 mm (2.70 ≤ WE ≤ 3.00 mm); LP = 1.20 ± 0.03 mm (1.15 ≤ LP ≤ 1.23 mm); WP = 2.32 ± 0.08 mm (2.20 ≤ WP ≤ 2.40 mm); LAN = 2.40 ± 0.10 mm (2.25 ≤ LAN ≤ 2.50 mm); LAED = 2.18 ± 0.05 mm (2.13 ≤ LAED ≤ 2.25 mm); LB = 5.12 ± 0.08 mm (5.00 ≤ LB ≤ 5.20 mm); LE/LP = 3.33 ± 0.07 (3.26 ≤ LE/LP ≤ 3.42); WE/WP = 1.25 ± 0.02 (1.23 ≤ WE/WP ≤ 1.28); WP/LP = 1.94 ± 0.05 (1.88 ≤ WP/LP ≤ 2.00); WE/LE = 0.73 ± 0.01 (0.72 ≤ WE/LE ≤ 0.73); LAN/LB = 0.47 ± 0.01 (0.45 ≤ LAN/LB ≤ 0.49); LE/LAED = 1.83 ± 0.06 (1.76 ≤ LE/LAED ≤ 1.93). **Females** (n = 3; mean ± standard deviation; range): LE = 4.33 ± 0.12 mm (4.20 ≤ LE ≤ 4.40 mm); WE = 3.24 ± 0.04 mm (3.20 ≤ WE ≤ 3.28 mm); LP = 1.21 ± 0.01 mm (1.20 ≤ LP ≤ 1.23 mm); WP = 2.48 ± 0.04 mm (2.43 ≤ WP ≤ 2.50 mm); LAN = 2.25 ± 0.05 mm (2.20 ≤ LAN ≤ 2.30 mm); LSP = 0.78 ± 0.03 mm (0.75 ≤ LSP ≤ 0.80 mm); LB = 5.58 ± 0.20 mm (5.40 ≤ LB ≤ 5.80 mm); LE/LP = 3.59 ± 0.14 (3.43 ≤ LE/LP ≤ 3.67); WE/WP = 1.31 ± 0.04 (1.28 ≤ WE/WP ≤ 1.35); WP/LP = 2.05 ± 0.03 (2.02 ≤ WP/LP ≤ 2.08); WE/LE = 0.75 ± 0.01 (0.74 ≤ WE/LE ≤ 0.76); LAN/LB = 0.40 ± 0.02 (0.39 ≤ LAN/LB ≤ 0.43); LE/LSP = 5.53 ± 0.06 (5.50 ≤ LE/LSP ≤ 5.60).

Distribution. Republic of South Africa (WCape) (Fig. 6). Chorotype: Southern-Western Afrotropical (SWA).

Ecological notes. Habitat and host plants unknown. Adults collected in January, April and December.

Calotheca parvula (Weise, 1908)

Figs 4A–D, 6

Eutheca parvula Weise, 1908: 151
Calotheca parvula (Weise): Biondi et al. 2017: 124 (pars)

Type material examined. ***Lectotype*** ♀**:** Brit. SW-Afrika [RSA, NCape], Kl. Namaland, Steinkopf [29°15'30"S, 17°43'41"E], vii.[19]04, L. Schultze S./N, 718 (M. Biondi des. 2017) (ZMHB). ***Paralectotypes*:** Same data as lectotype, 1♀ (NHMUK).

Additional material examined. Republic of South Africa: [ECape], Aliwal N.[orth], [30°41'56"S, 26°43'22"E], 13.v.[19]79, on *Rhus* sp., RSA 332, L. Viljoen

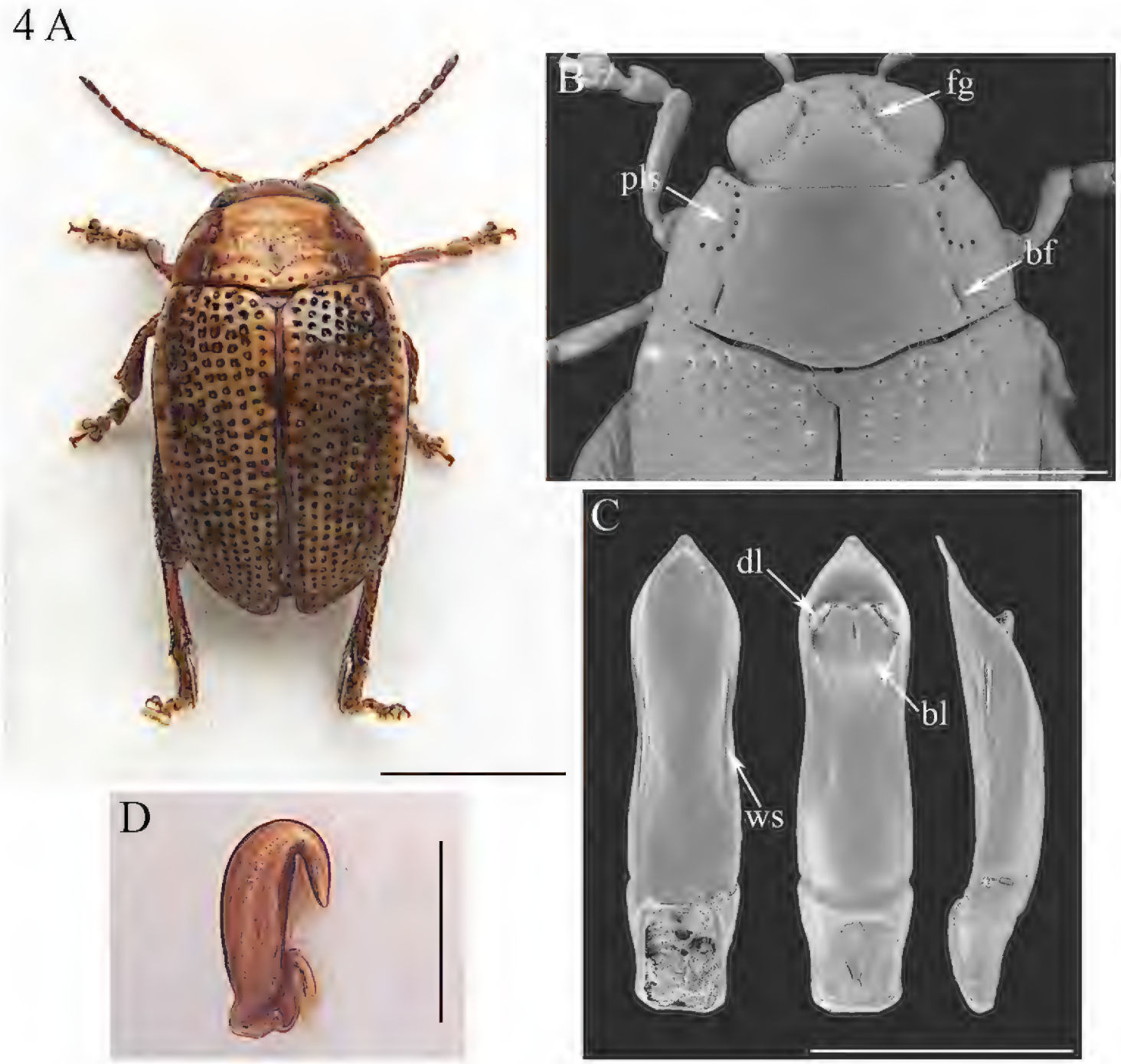

Figure 4. *Calotheca parvula* (Weise, 1908) **A** habitus ♂ (RSA: NCape, Nieuwoudtville Botanic Gardens) **B** head, pronotum, and basal part of elytra, ♂ (RSA: WCape, Bidouw Valley) **C** median lobe of aedeagus, from left to right in ventral, dorsal, and lateral view (RSA: WCape, Karoo National Park) **D** spermatheca (RSA: NCape, Steinkopf). Abbreviations: bf = basal furrow; bl = basal lobe of dorsa ligula; dl = distal lobe of dorsa ligula; fg = frontal groove; pls = punctate lateral stria; ws = wrinkled surface. Scale bars: 2 mm (**A**); 1 mm (**B, C**); 0.5 mm (**D**).

leg., 2 specimens (SANC); C.P. [NCape], Nieuwoudtville Botanic Gardens, 31°22'S, 19°07'E, 9.ix.1987, C.D. Eardley leg., 1 specimen (SANC); [NCape], Nieuwoudtville, 700–750 m [31°22'39"S, 19°06'08"E], fynbos & grassland, on *Rhus* sp., 15.ix.1994, P. Audisio, M. Biondi, M.A. Bologna leg., 1 specimen (BAQ); KP. [NCape], Petrusville [30°05'11"S, 24°39'15"E], xii.1960, AcCol.40, J. v. Vuuren leg., 4 specimens (SANC); N&W Cape [NCape], route Kliprand-Loeriesfontein [30°48'41"S, 19°00'31"E], 31.x.1999, M. Snizek leg., 1 specimen (BAQ); C.P. [WCape], Clanwilliam District, Bidouw Valley, 32°08'S, 19°14'E, 7.ix.1987, C.D. Eardley leg., 2 specimens (SANC); Cape Province [WCape], Karoo National Park, 12–14.xi.1993, 32°19'S, 22°30'E, J.

Deckert leg., 1 specimen (ZMHB); [WCape], Bushmanld., Jackals Water, [29°49'00"S, 22°33'00"E], x.1911, Lightfoot leg., 4 specimens (SANC); South-West Afric, Aus. 8–30.xi.1929, R.E. Turner leg., 1930-113, 1 specimen (NHMUK). Namibia: [Karas], Zebrafontein, ca 30 km NNE RoshPinah, 27°45'S, 16°53'E, 2–6.iv.2002, E. Holm & H. Gebhardt leg., 1 specimen (SANC).

Taxonomic remarks. Body size in both males and females smaller compared to the other species in the *C. parvula* group, with the exception of males of *C. danielssoni* sp. nov. Head, antennae and legs brown; tibiae, tarsi and basal antennomeres slightly paler in some specimens; pronotum yellow, with wide dark reddish-brown patches laterally, at least on punctate lateral striae and basal furrows; elytra dirty-yellow, with distinctly darkened punctures and small sparse irregular patches on the disc, one of which is larger and always present on the suture at the end of the scutellar row of punctures (Fig. 4A). Pronotal lateral striae C-shaped, with punctures larger and more deeply impressed than on the elytra; basal furrows of pronotum deeply impressed; pronotal surface apparently rough, micropunctate, with additional small irregular punctation; a shallow but evident v-shaped wrinkle medially, near the pronotal base; evident punctation lining basal margin (Fig. 4A, B). Basal pro- and mesotarsomeres in male moderately enlarged (Fig. 4A). Median lobe of aedeagus (Fig. 4C) distinctly sinuate laterally in ventral view; narrowing gradually apically to terminate in an acute median tooth; surface smooth, slightly wrinkled ventrolaterally; dorsal ligula short, formed by two wider truncate basal lobes which taper apically, and two thinner lateral distal lobes; in lateral view, median lobe moderately bent down, with a slightly sinuate apex. Spermatheca (Fig. 4D) with basal part subcylindrical, generally slender, slightly curved; distal part clearly curved, slightly narrower and generally straight or externally oriented apically, with a very short appendix; distal part shorter than half the length of the basal part; ductus basally inserted, moderately elongate, with a single coil at most.

Biometrics. Males (n = 7; mean ± standard deviation, range): LE = 3.65 ± 0.15 mm (3.45 ≤ LE ≤ 3.90 mm); WE = 2.57 ± 0.13 mm (2.40 ≤ WE ≤ 2.80 mm); LP = 1.08 ± 0.07 mm (1.00 ≤ LP ≤ 1.20 mm); WP = 2.10 ± 0.09 mm (2.00 ≤ WP ≤ 2.25 mm); LAN = 2.00 ± 0.11 mm (1.90 ≤ LAN ≤ 2.10 mm); LAED = 1.81 ± 0.07 mm (1.68 ≤ LAED ≤ 1.88 mm); LB = 4.61 ± 0.22 mm (4.33 ≤ LB ≤ 5.00 mm); LE/LP = 3.38 ± 0.12 (3.20 ≤ LE/LP ≤ 3.55); WE/WP = 1.22 ± 0.02 (1.20 ≤ WE/WP ≤ 1.25); WP/LP = 1.94 ± 0.05 (1.88 ≤ WP/LP ≤ 2.00); WE/LE = 0.70 ± 0.02 (0.68 ≤ WE/LE ≤ 0.73); LAN/LB = 0.43 ± 0.02 (0.41 ≤ LAN/LB ≤ 0.47); LE/LAED = 2.02 ± 0.06 (1.92 ≤ LE/LAED ≤ 2.08). **Females** (n = 10; mean ± standard deviation; range): LE = 3.80 ± 0.24 mm (3.30 ≤ LE ≤ 4.15 mm); WE = 2.73 ± 0.21 mm (2.40 ≤ WE ≤ 3.08 mm); LP = 1.06 ± 0.08 mm (0.95 ≤ LP ≤ 1.20 mm); WP = 2.19 ± 0.15 mm (1.95 ≤ WP ≤ 2.45 mm); LAN = 1.87 ± 0.12 mm (1.75 ≤ LAN ≤ 2.10 mm); LSP = 0.70 ± 0.05 mm (0.63 ≤ LSP ≤ 0.75 mm); LB = 4.79 ± 0.34 mm (4.10 ≤ LB ≤ 5.25 mm); LE/LP = 3.59 ± 0.10 (3.46 ≤ LE/LP ≤ 3.75); WE/WP = 1.25 ± 0.03 (1.19 ≤ WE/WP ≤ 1.29); WP/LP = 2.07 ± 0.05 (2.00 ≤ WP/LP ≤ 2.15); WE/LE = 0.72 ± 0.02 (0.68 ≤ WE/LE ≤ 0.74); LAN/LB = 0.39 ± 0.03 (0.36 ≤ LAN/LB ≤ 0.43); LE/LSP = 5.46 ± 0.38 (4.89 ≤ LE/LSP ≤ 5.92).

Distribution. Namibia (Karas); Republic of South Africa (ECape, NCape, WCape) (Fig. 6).

Chorotype: Southern-Western Afrotropical (SWA).

Ecological notes. Collected between 700–750 m a.s.l. in fynbos vegetation and grassland, on *Searsia* spp. [= *Rhus* pars., cf. Moffett (2007)] (Anacardiaceae). Adults active in April, May, July, September, October, November, December.

***Calotheca prinslooi* sp. nov.**

http://zoobank.org/0870B572-50C3-409A-954E-554354D4AB7E

Figs 5A–D, 6

Calotheca parvula (Weise): Biondi et al. 2017: 124 (pars)

Calotheca pallida (Bryant): Biondi et al. 2017: 123 (pars)

Type material. ***Holotype*** ♂**:** South Africa [RSA], Western Cape, Swellendam (N env.), 150 m, near Marloth Nat. Res., 34°00.607'S, 20°25.874'E [34°00'35"S, 20°25'57"E], 3–11.xii.2007, Martin Řiha leg. (SANC). ***Paratypes*:** Republic of South Africa: CP [ECape], Groendal Dam nr Uitenhage, 33°42'S, 25°15'E, 10.iii.1983, W. Breytenbach leg., 2♂ and 1♀ (SANC); ECape, Willow River Farm, 33°32'S, 24°49'E, collected from *Rhus pallens* (Anacardiaceae), 29.xi.1988, E. Grobbelaar leg., 10♂ and 10♀ (SANC); (S), ECape, 175 m, -33.0659, 27.2098 [33°03'57"S, 27°12'35"E], N2 Rd side 20 km N of Peddie, karoo vegetation, 18.xi.2013, M. Wanat leg., 1♀ (UWCP); C.P. [ECape], Grahamstown [33°19'24"S, 26°31'48"E], i.1979, C. Kok & S.J. van Tonder leg., 1♀ (SANC); [ECape], 10 km South of Addo, 100 m, 35°46'S, 25°45'E [33°36'58"S, 25°42'41"E], xi.1988, E. Colonnelli leg., 1♀ (BAQ); [ECape], 16 m North Steytlerville [33°17'40"S, 24°22'20"E], 24.x.[19]64, A.L. Capener leg., 2♀ (SANC); ECape, Hankey, 33°50'S, 24°53'E, R. Stals leg., 2♀ (SANC); C.P. [ECape], Jeffreys Bay, 34°02'S, 24°50'E, 22.xi.1983, G.L. Prinsloo & N.C. Grobbelaar leg., 1♀ (SANC); ECape, Mondhoek, 12 km NNE of Jeffreys Bay, 33°56.5'S, 24°59'E, 02.i.1997, R. Stals leg., 1♀ (SANC); [ECape], road Grahamstown to Alexandria, 350 m, 33°23.97S, 26°28.43E [33°23'58"S, 26°28'26"E], 3.v.2005, P. Audisio & E. Colonnelli leg., 1♀ (BAQ); ECape, Zuurberg Nature Reserve, 900 m, 33°16'S, 25°45'E, 28.xi.1988, adults collected from *Rhus dentata* (Anacardiaceae), E. Grobbelaar leg., 1♀ (SANC); [WCape], same data as the holotype, 2♂ and 1♀ (BAQ); S. Cape [WCape], Uniondale, 33°39'S, 23°07'E, 19.i.1979, S.J. van Tonder & C. Kok leg., 1♂ (SANC); [WCape], Agulhas [34°48'59"S, 20°00'55"E], 8.i.[19]71, A. Prinsloo leg., 1♂ and 2♀ (SANC); ditto, D. Wessels leg., 2♂ and 1♀ (SANC); Western Cape, W of Calitzdorp-Huisrivierspas [33°30'50"S, 21°35'38"E], m 662, 19.iv.1998, S. Zoia & F. Polese leg., 1♀ (BAQ); [WCape], Malagas [34°18'S, 20°34'59"E], 29.ii.1932, R.E. Turner leg., 1♀ (NHMUK); [WCape], Bontebok National Park, 34°04'S, 20°27'E, 20.iv.1995, U. Göllner leg., 3♀ (BAQ); W Cape, 530 m, -33.7127, 22.2981 [33°42'54"S, 22°17'45"E], Klein Karoo, N12 Rd, 15 km S Oudtshoorn, roadside karoo vegetation, 30.xi.2013, M. Wanat leg., 2♀ (UWCP).

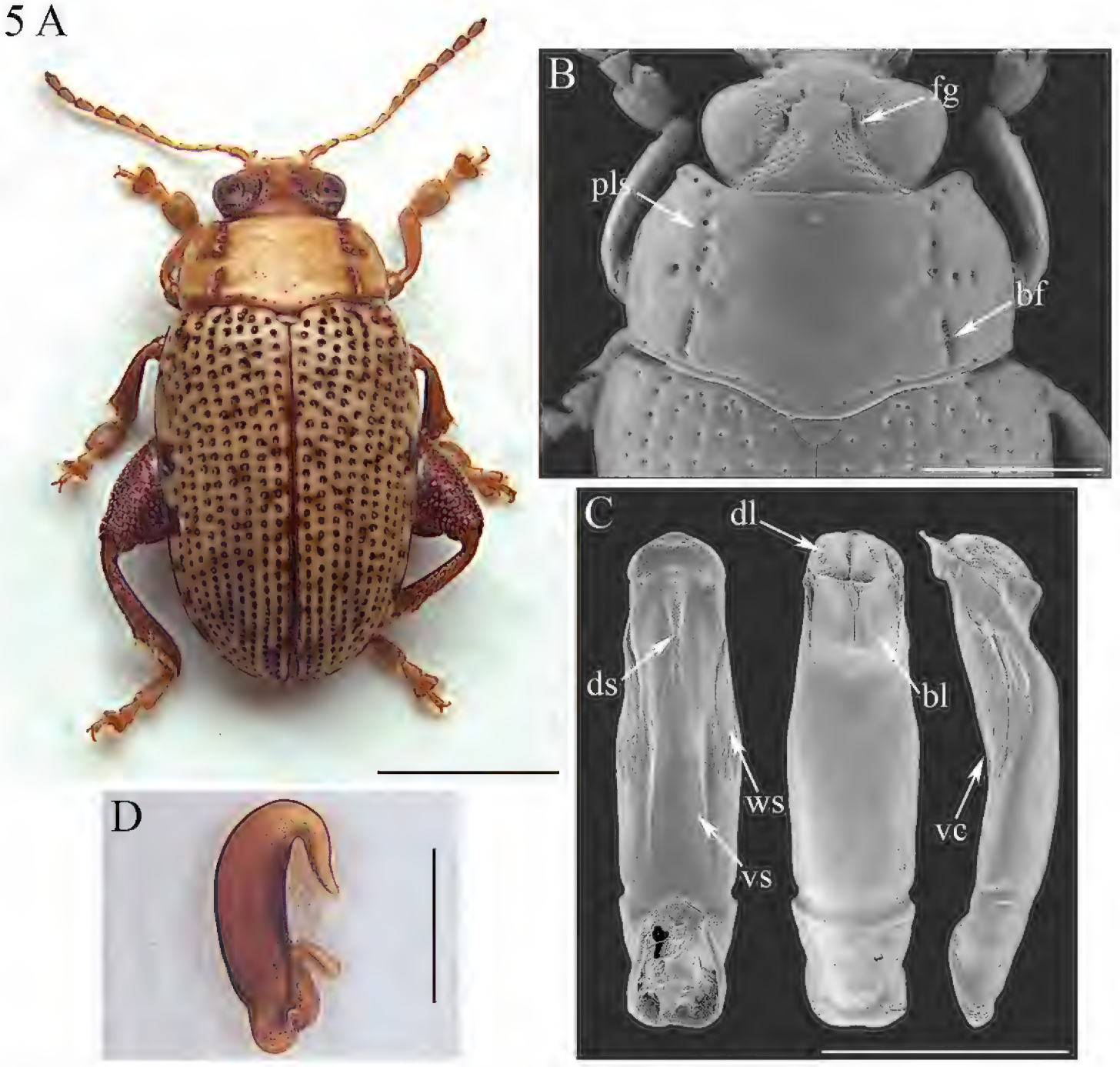

Figure 5. *Calotheca prinslooi* sp. nov. **A** habitus, ♂ (holotype) **B** head, pronotum, and basal part of elytra, ♂ (RSA: ECape, Willow River Farm) **C** median lobe of aedeagus, from left to right in ventral, dorsal, and lateral view (RSA: WCape, Swellendam) **D** spermatheca (ECape, Willow River Farm). Abbreviations: bf = basal furrow; bl = basal lobe of dorsa ligula; dl = distal lobe of dorsa ligula; ds = distal sulcus; fg = frontal groove; pls = punctate lateral stria; vc = ventral carina; vs = ventral sulcus; ws = wrinkled surface. Scale bars: 2 mm (**A**); 1 mm (**C, B**); 0.5 mm (**D**).

Diagnosis. *Calotheca prinslooi* sp. nov. is very similar in shape, size, sculpture and colour to *C. oberprieleri* sp. nov. and *C. pallida*. Males are easily distinguishable by: the first pro- and mesotarsomeres which are distinctly enlarged and rounded (less enlarged and/or subtriangular in *C. oberprieleri* sp. nov. and *C. pallida*) (Figs 2A, 3A, 5A); the aedeagus in ventral view, distinctly wider medially, wider basally than apically, and tapering slightly towards the bluntly rounded apex (sinuate, narrow in the apical third, wider basally than apically in *C. oberprieleri* sp. nov.; sinuate, narrowing medially, as wide basally as apically in *C. pallida*), and ventral surface with two basally divergent carinae (ventral surface flat in *C. oberprieleri* sp. nov.; ventral carinae subparallel in *C. pallida*) (Figs 2C, 3C, 5C). Females can be distinguished from *C. oberprieleri* sp. nov.

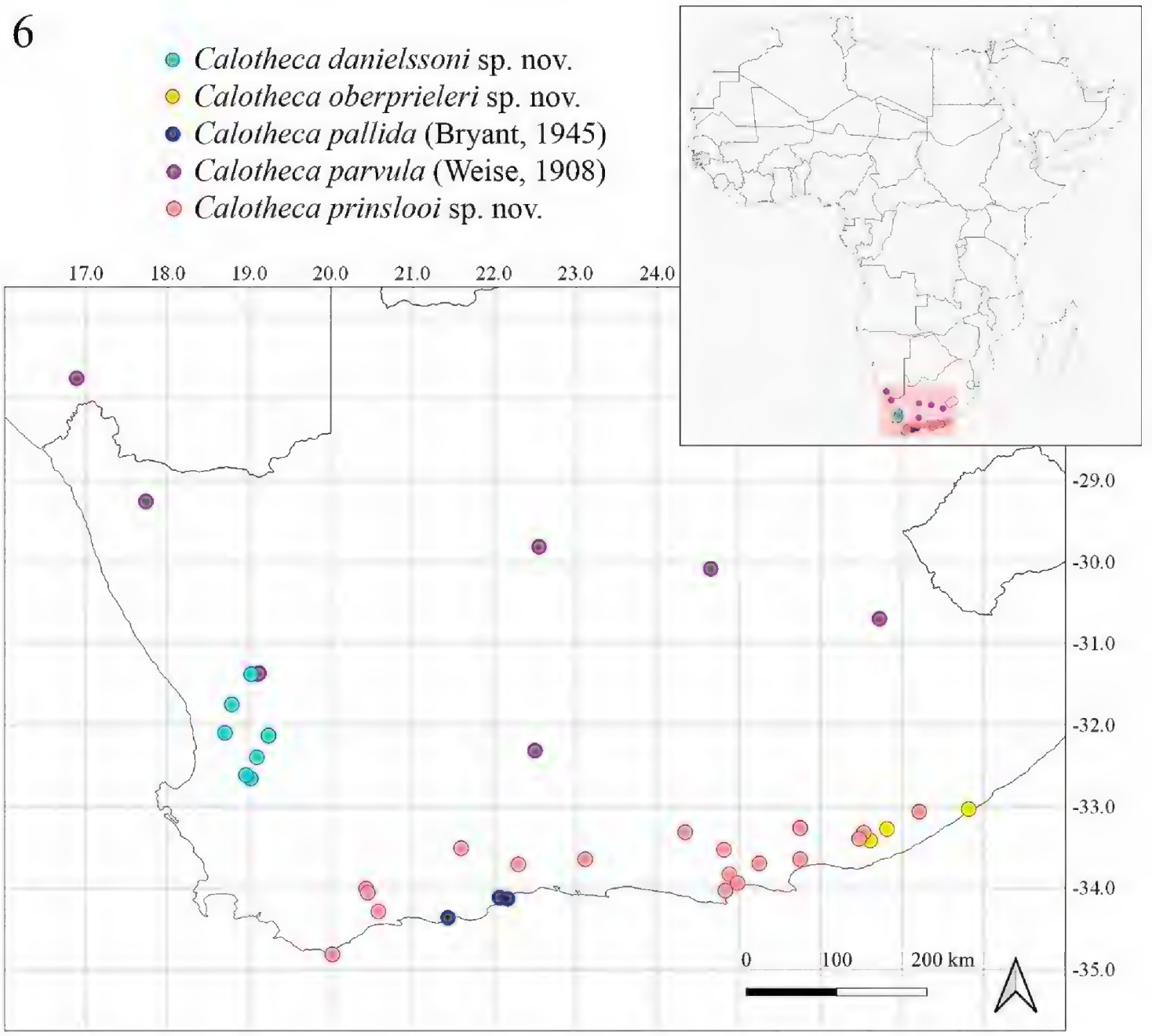

Figure 6. Distribution of *Calotheca parvula* species group.

and *C. pallida* mainly by the shape of the spermatheca, which is quite variable, but never reniform basally as in *C. oberprieleri* sp. nov., nor with apical part abruptly bent and curved to the apex as in *C. pallida* (Figs 2D, 3D, 5D).

Description of the holotype (♂). Body elongate-elliptical in dorsal view (Fig. 5A), moderately convex in lateral view; total length of body (LB = 5.50 mm); maximum pronotal width near base (WP = 2.25 mm); maximum width of elytra at basal third (WE = 2.80 mm). Head, apical antennomeres and legs pale brown; frons, labrum, and first antennomeres slightly paler brown; hind femora, hind and middle tibiae distinctly darker; pronotum yellow, punctate lateral striae and basal furrows distinctly darkened; elytra yellow, with darkened punctures, and small, irregular, sparse reddish-brown patches, larger on the last interstria. Head (cf. Fig. 5B) with wrinkled and micropunctate surface, with some punctures on frons; several setiferous punctures between medial ocular margin and frontal grooves, and near the dorsal part of frontal grooves; frontal grooves very deeply impressed more so anteriorly, sinuate, extending from dorsal ocular margin to interantennal space; interantennal space wide, about

1.5 times the length of the first antennomere; eyes elongate-ovate; dorsal interocular space wider than 1.5 times the transversal width of eye; antennae slightly shorter than half the body length (LAN = 2.50 mm; LAN/LB = 0.45; LA: 100:50:71:79:86:86:86:86:82:79:100). Pronotum (cf. Fig. 5B) barely convex, slightly sub-trapezoidal, distinctly transverse (LP = 1.20 mm; WP/LP = 1.88), with distinctly rounded sides; surface almost smooth, finely microreticulate and sparsely micropunctate, with additional small sparse punctation; pronotal lateral striae C-shaped, with large, deeply impressed punctures; basal furrows of pronotum deeply impressed; basal and apical margins distinctly bordered but not raised; lateral margins barely expanded but visible in dorsal view; anterior angles moderately prominent and pointed; posterior angles widely obtuse. Scutellum sub-triangular, apically rounded. Elytra (Fig. 5A, cf. 5B) moderately elongate and convex (LE = 4.08 mm; WE/LE = 0.69; LE/LP = 3.40), slightly sinuate laterally, jointly rounded apically; lateral margin narrow, barely visible in dorsal view; elytral punctation arranged in single regular rows, punctures deeply impressed; interstriae with finely microreticulate and micropunctate surface; last interstria carinate; humeral calli barely raised. Macropterous. Legs with basal pro- and mesotarsomeres distinctly enlarged, sub-rounded (Fig. 5A). Tarsal claws simple. Underside brown; apical abdominal ventrite without preapical sculpture or impressions. Median lobe of aedeagus (cf. Fig. 5C) (LAED = 2.05 mm; LE/LAED = 1.99) with greatest width medially, wider basally than apically, and tapering towards the apex; apex bluntly rounded with small ventrolateral bulges; ventral surface with two basally divergent carinae delimiting a wide sulcus, which becomes narrower and shallower distally; narrow distal sulcus in the apical third; ventrolateral surface widely wrinkled; dorsal ligula short, formed by two subtruncate basal lobes and two shorter apical lobes; in lateral view, median lobe distinctly bent down to the apex, and distinctly sinuate on the ventral apical surface.

Variability. Males (n = 10; mean ± standard deviation, range): LE = 4.03 ± 0.20 mm (3.50 ≤ LE ≤ 4.25 mm); WE = 2.89 ± 0.17 mm (2.80 ≤ WE ≤ 3.15 mm); LP = 1.23 ± 0.06 mm (1.10 ≤ LP ≤ 1.30 mm); WP = 2.33 ± 0.12 mm (2.05 ≤ WP ≤ 2.45 mm); LAN = 2.49 ± 0.11 mm (2.25 ≤ LAN ≤ 2.65 mm); LAED = 2.10 ± 0.07 mm (1.98 ≤ LAED ≤ 2.25 mm); LB = 5.52 ± 0.32 mm (4.85 ≤ LB ≤ 6.00 mm); LE/LP = 3.27 ± 0.09 (3.10 ≤ LE/LP ≤ 3.40); WE/WP = 1.24 ± 0.03 (1.21 ≤ WE/WP ≤ 1.29); WP/LP = 1.89 ± 0.03 (1.84 ≤ WP/LP ≤ 1.92); WE/LE = 0.72 ± 0.02 (0.69 ≤ WE/LE ≤ 0.75); LAN/LB = 0.45 ± 0.02 (0.42 ≤ LAN/LB ≤ 0.47); LE/LAED = 1.92 ± 0.06 (1.77 ≤ LE/LAED ≤ 1.98). **Females** (n = 10; mean ± standard deviation; range): LE = 4.11 ± 0.15 mm (3.90 ≤ LE ≤ 4.30 mm); WE = 3.02 ± 0.10 mm (2.90 ≤ WE ≤ 3.28 mm); LP = 1.15 ± 0.04 mm (1.10 ≤ LP ≤ 1.23 mm); WP = 2.36 ± 0.08 mm (2.20 ≤ WP ≤ 2.45 mm); LAN = 2.20 ± 0.08 mm (2.05 ≤ LAN ≤ 2.35 mm); LSP = 0.76 ± 0.04 mm (0.70 ≤ LSP ≤ 0.80 mm); LB = 5.53 ± 0.24 mm (5.25 ≤ LB ≤ 5.95 mm); LE/LP = 3.57 ± 0.15 (3.27 ≤ LE/LP ≤ 3.74); WE/WP = 1.28 ± 0.03 (1.25 ≤ WE/WP ≤ 1.34); WP/LP = 2.04 ± 0.05 (1.98 ≤ WP/LP ≤ 2.13); WE/LE = 0.74 ± 0.02 (0.70 ≤ WE/LE ≤ 0.77); LAN/LB = 0.40 ± 0.01 (0.38 ≤ LAN/LB ≤ 0.42); LE/LSP = 5.44 ± 0.28 (4.88 ≤ LE/LSP ≤ 5.79).

Paratypes similar in shape, sculpture and colour to the holotype. Some specimens either slightly paler or darker, and/or with surface sculpture on head slightly variable. Female with basal pro- and mesotarsomeres less enlarged than in male. Spermatheca (Fig. 5D) quite variable, basal part broadly subcylindrical or subconical, slightly thickset to slender, straight or barely curved; distal part generally softly bent, distinctly narrower and often externally oriented apically, with a very short appendix; distal part shorter than half the length of the basal part; ductus basally inserted, short to moderately elongate, generally with a single coil, or with a pair of irregular loops at most.

Etymology. The specific epithet is a noun in the genitive case after Godfried L. Prinsloo (Republic of South Africa, Pretoria), one of its collectors.

Distribution. Republic of South Africa (ECape, WCape) (Fig. 6). Chorotype: Southern-Western Afrotropical (SWA).

Ecological notes. Collected from 100–900 m a.s.l., in karoo vegetation, on *Searsia pallens* and *S. dentata* [= *Rhus* pars, cf. Moffett (2007)] (Anacardiaceae). Adults active in January, February, March, April, May, October, November, December.

Discussion

Calotheca danielssoni sp. nov., *C. oberprieleri* sp. nov., *C. pallida*, *C. parvula*, and *C. prinslooi* sp. nov. are attributed to the same species group because they share the following characteristics (Figs 1–5): body elongate-elliptical, small to medium sized (4.05 ≤ LB ≤ 6.20 mm); integument from yellow to pale brown, generally with darker reddish-brown to dark brown patches on the pronotum and/or elytra; pronotal lateral striae C-shaped on disc, comprised of large deeply impressed punctures; basal furrows of pronotum deeply impressed; pronotal surface relatively smooth, or at most with shallow lateral depressions and small punctures; elytral punctures large, deeply impressed, and individually darkened – striae not darkened; and simple tarsal claws. Species also share a similar spermathecal morphology (Figs 1E, 2D, 3D, 4D, 5D): basal part elongate and broadly sub-cylindrical; distal part distinctly bent, narrower, and shorter than half of the basal part, with a very small appendix; ductus apically inserted, thickset, moderately to distinctly elongate, generally with some loops and/or a single coil. The median lobe of the aedeagus (Figs 1B, C, 2C, 3C, 4C, 5C) reveals primary affinities among *C. danielssoni* sp. nov., *C. oberprieleri* sp. nov., *C. pallida* and *C. prinslooi* sp. nov., due to: a narrow ventral medial sulcus in apical third; apex bearing small ventrolateral bulges (apex more prominent laterally in specimens of *C. danielssoni* sp. nov.); dorsal ligula formed by two basal and two distal lobes; paired ventral carinae delimiting a wide ventral sulcus (present in *C. danielssoni* sp. nov., *C. pallida* and *C. prinslooi* sp. nov.). The group occurs in the southernmost part of the distribution range for the genus, precisely, the Republic of South Africa and Namibia (Fig. 6), which host respectively 22 and 6 *Calotheca* species based on the present contribution and the previously published data (Biondi et al. 2017). It is associated with the plant genus *Searsia* (Anacardiaceae) in fynbos, karoo, and grassland vegetation. Data on host plants thus confirm the association of the genus with the plant family Anacardiaceae.

Key to species of the *Calotheca parvula* group

1 Elytral punctures larger and more deeply impressed than those of the pronotal striae (Fig. 1A, D). Median lobe of aedeagus with apical part distinctly wider than the remaining length; dorsal ligula with clearly truncate basal lobes, about as long as, or slightly longer than, distal lobes (Fig. 1B, C) ..... ***Calotheca danielssoni* sp. nov.**

– Elytral punctures as large as, or smaller than, those of the pronotal striae (Figs 2A, B, 3A, B, 4A, B, 5A, B). Median lobe of aedeagus with apical part as wide as, or narrower than, the remaining length; dorsal ligula with subtruncate basal lobes, distinctly longer than apical lobes (Figs 2C, 3C, 4C, 5C) **2**

2 Basal pro- and mesotarsomeres in male moderately enlarged (Fig. 4A). Median lobe of aedeagus (Fig. 4C) narrowing gradually apically to terminate in an acute median tooth; distal lobes of dorsal ligula thinner and more lateral. Body size smaller (LB generally < 5.00 mm in males, and < 5.25 mm in females). Integuments generally darker; pronotum with more evident v-shaped wrinkle near the base, and more evident punctation lining basal margin; a larger elytral patch always present on the suture at the end of the scutellar row of punctures (Fig. 4A) ..... ***C. parvula* (Weise, 1908)**

– Basal pro- and mesotarsomeres in male distinctly enlarged (Figs 2A, 3A, 5A). Median lobe of aedeagus with apex subrounded or obtuse subtriangular, rounded laterally, with small ventrolateral bulges; distal lobes of dorsal ligula thickset and apical (Figs 2C, 3C, 5C). Integuments generally paler; pronotum with barely visible v-shaped wrinkle near the base, and less evident punctation lining basal margin; elytral patch on the suture at the end of the scutellar row of punctures absent or as large as other elytral patches (Figs 2A, 3A, 5A) **3**

3 Surface of median lobe of aedeagus flat ventrally (Fig. 2C). Spermatheca subreniform and thickset basally (Fig. 2D). Pronotal margins more rounded laterally (Fig. 2B) ..... ***C. oberprieleri* sp. nov.**

– Surface of median lobe of aedeagus with ventral carinae delimiting a deep sulcus (Figs 3C, 5C). Spermatheca broadly subcylindrical and more slender basally (Figs 3D, 5D). Pronotal margins less rounded or more distinctly curved at apical third (Figs 3B, 5B) **4**

4 First pro- and mesotarsomeres in male distinctly enlarged and rounded (Fig. 5A). Median lobe of aedeagus in ventral view, distinctly wider medially, wider basally than apically, and tapering slightly towards the apex (Fig. 5C). Spermatheca never with apical part abruptly bent and curved up to the apex (Fig. 5D)..... ***C. prinslooi* sp. nov.**

– First pro- and mesotarsomeres in male distinctly enlarged and subtriangular (Fig. 3A). Median lobe of aedeagus in ventral view, narrowing medially, as wide basally as apically. Spermatheca with apical part abruptly bent and curved up to the apex (Fig. 3D) ..... ***C. pallida* (Bryant, 1945)**

Conclusion

C. danielssoni sp. nov., *C. oberprieleri* sp. nov., *C. pallida*, *C. parvula*, and *C. prinslooi* sp. nov. are here attributed to the *C. parvula* species group based on their external morphology and characters of the median lobe of the aedeagus and spermatheca. Species can easily be identified by the shape of the median lobe of the aedeagus. Spermathecal characters are generally not reliable for identification, because intraspecific variability can encompass interspecific variability. However, the combination of some unique external characters and spermathecal features may be useful to also distinguish females (see Key to species).

The genus *Calotheca* currently includes 32 species. However, new material under examination reveals the occurrence of several undetermined species, along with a high degree of variability within the already known species (Biondi, unpublished data). The study of that material and the revision of the described species will provide a more in-depth insight into the contribution that *Calotheca* gives to the African biodiversity.

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